

What is claimed is:

1. A thermal printer comprising:

a plurality of thermal print heads, each of the plurality of thermal print heads being operable to print  
5 a distinct one of a plurality of colors; and

dot size varying means for varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by the plurality of thermal print heads.

2. The thermal printer of claim 1, wherein a first  
10 one of the plurality of thermal print heads has a first number of thermal elements that is energizable at a first rate, wherein a second one of the plurality of thermal print heads has a second number of thermal elements that is energizable at a second rate, the first  
15 number being different than the second number, the first rate being different from the second rate.

3. The thermal printer of claim 1, wherein the plurality of colors comprises cyan, magenta, and yellow.

4. The thermal printer of claim 3, wherein the  
20 plurality of colors further comprises black.

5. The thermal printer of claim 1, further comprising:

means for performing tone scale adjustment on an image to be printed;

25 means for performing thermal history correction on the image to be printed;

means for performing resistance profile correction on the image to be printed;

30 means for performing dithering on the image to be printed;

means for performing halftone dot location adjustment on the image to be printed; and

means for performing common mode voltage correction on the image to be printed.

5        6. A thermal printer comprising:

a plurality of thermal print heads, each of the plurality of thermal print heads being operable to print a distinct one of a plurality of colors, said plurality of thermal print heads being used to perform a thermal  
10 mass transfer method of printing selected from the group consisting of: (1) thermal mass transfer of a dye or pigment containing wax or resin, and (2) thermal mass transfer of an amorphous dye in combination with a thermal solvent.

15        7. The thermal printer of claim 6, further comprising:

dot size varying means for varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by the plurality of thermal print heads.

20        8. The thermal printer of claim 6, wherein a first one of the plurality of thermal print heads has a first number of thermal elements that is energizable at a first rate, wherein a second one of the plurality of thermal print heads has a second number of thermal  
25 elements that is energizable at a second rate, the first number being different than the second number, the first rate being different from the second rate.

9. The thermal printer of claim 6, wherein the plurality of colors comprises cyan, magenta, and yellow.

30        10. The thermal printer of claim 9, wherein the plurality of colors further comprises black.

11. The thermal printer of claim 6, further comprising:

means for performing tone scale adjustment on an image to be printed;

5 means for performing thermal history correction on the image to be printed;

means for performing resistance profile correction on the image to be printed;

10 means for performing dithering on the image to be printed;

means for performing halftone dot location adjustment on the image to be printed; and

means for performing common mode voltage correction on the image to be printed.

15 12. A thermal printer comprising:

a plurality of thermal print heads;

means for performing tone scale adjustment on an image to be printed;

20 means for performing thermal history correction on the image to be printed;

means for performing resistance profile correction on the image to be printed;

means for performing dithering on the image to be printed;

25 means for performing halftone dot location adjustment on the image to be printed; and

means for performing common mode voltage correction on the image to be printed.

13. The thermal printer of claim 12, wherein the means for performing tone scale adjustment, the means for performing thermal history correction, the means for performing resistance profile correction, the means for performing dithering, the means for performing halftone dot location adjustment, and the means for performing common mode voltage correction are arranged to perform their respective functions in the order recited in claim 12.

14. A digital photo-printing vending machine comprising:

image data input means for receiving at least one input image from a customer;

payment means for receiving a payment from the customer for printing the at least one input image; and

output means for printing the at least one input image from the customer, the output means comprising a plurality of thermal print heads.

15. The digital photo-printing vending machine of claim 14, wherein the output means further comprises dot size varying means for varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by the plurality of thermal print heads.

16. The digital photo-printing vending machine of claim 15, wherein each of the plurality of thermal print heads is operable to print a distinct one of a plurality of colors.

17. The digital photo-printing vending machine of claim 14, wherein a first one of the plurality of thermal print heads has a first number of thermal elements that is energizable at a first rate, wherein a

second one of the plurality of thermal print heads has a second number of thermal elements that is energizable at a second rate, the first number being different than the second number, the first rate being different from the  
5 second rate.

18. The digital photo-printing vending machine of claim 14, wherein the image data input means comprises means for receiving the at least one input image from a digital electronic storage medium.

10 19. The digital photo-printing vending machine of claim 18, wherein the image data input means comprises means for converting at least one analog image provided by the customer into the at least one input image, wherein the at least one input image comprises at least  
15 one digital image.

20. The digital photo-printing vending machine of claim 14, wherein the at least one input image comprises a plurality of input images, and wherein the digital photo-vending machine further comprises image file  
20 preparation means for converting the plurality of input images into a plurality of standardized images sharing a standardized file format.

21. The digital photo-printing vending machine of claim 20, wherein the image file preparation means  
25 comprises:

image file initial standardization means for processing the plurality of input images to produce a plurality of initial standardized images;

image file enhancement means for processing the  
30 plurality of initial standardized images to produce a plurality of enhanced images; and

image file final standardization means for processing the plurality of enhanced images to produce the plurality of standardized images.

22. The digital photo-printing vending machine of  
5 claim 21, wherein the image file initial standardization means comprises means for cropping each of the plurality of input images to a standard aspect ratio.

23. The digital photo-printing vending machine of  
10 claim 21, wherein the image file initial standardization means comprises:

means for determining, for each of the plurality of input images, whether the dimensions of the input image are greater than standard pixel dimensions; and

means for changing to the standard pixel dimensions  
15 the dimensions of only those input images whose dimensions are determined to be greater than the standard pixel dimensions.

24. The digital photo-printing vending machine of  
20 claim 21, wherein the image file initial standardization means comprises means for assigning RGB color values having a common bit depth to pixels in each of the plurality of input images.

25. The digital photo-printing vending machine of  
25 claim 21, wherein the image file initial standardization means comprises means for rotating each of the plurality of input images into a standard orientation.

26. The digital photo-printing vending machine of  
30 claim 21, wherein the image file initial standardization means comprises means for converting each of the plurality of input images that is not stored in a

predetermined image file format into the predetermined image file format.

27. The digital photo-printing vending machine of claim 21, wherein the image file enhancement means  
5 comprises means for sharpening each of the plurality of initial standardized images.

28. The digital photo-printing vending machine of claim 21, wherein the image file enhancement means  
10 comprises means for performing exposure correction on each of the plurality of initial standardized images.

29. The digital photo-printing vending machine of claim 21, wherein the image file enhancement means  
comprises means for performing color balance correction on each of the plurality of initial standardized images.

15 30. The digital photo-printing vending machine of claim 21, wherein the image file enhancement means comprises means for performing color matching on each of the plurality of initial standardized images.

31. The digital photo-printing vending machine of  
20 claim 14, further comprising a customer interface, the customer interface comprising:

data entry means for receiving input from the customer; and

display means for displaying output to the  
25 customer.

32. The digital photo-vending machine of claim 31, wherein the data entry means and the display means comprise a single touch screen.

33. The digital photo-vending machine of claim 31, wherein the digital photo-printing vending machine further comprises:

a plurality of image data input means;

5 means for receiving from the user a selection of a particular one of the plurality of image data input means; and

means for using the selected image data input means as the image data input means for receiving the at least  
10 one input image from the customer.

34. The digital photo-printing vending machine of claim 31,

wherein the at least one input image comprises a plurality of input images,

15 wherein the digital photo-printing vending machine further comprises output selection means for receiving a selection from the customer of a subset of the plurality of input images; and

wherein the output means comprises means for  
20 printing the selected subset of the plurality of input images.

35. The digital photo-printing vending machine of claim 14, further comprising client means comprising:

the image data input means;

25 the payment means;

image file preparation means for converting the at least one input image into at least one standardized image having a standardized file format; and



means for communicating with server means according to a client-server protocol, the server means comprising image file processing means for processing the at least one standardized image to produce at least one processed  
5 image, the server means further comprising means for transmitting the at least one processed image to the output means for printing.

36. The digital photo-printing vending machine of claim 35, further comprising the server means.

10 37. The digital photo-printing vending machine of claim 36, wherein the client means comprises a first processor and wherein the server means comprises a second processor.

38. The digital photo-printing vending machine of  
15 claim 14, wherein the output means further comprises:

roll-fed printing means for delivering a receiver element to the plurality of print heads; and

cutting means for cutting the receiver element after the output means prints the at least one input  
20 image from the customer.

39. The digital photo-printing vending machine of claim 38, wherein the at least one input image comprises a plurality of input images and wherein the cutting means comprises means for cutting the receiver element  
25 between each of the plurality of input images.

40. The digital photo-printing vending machine of claim 39, wherein the cutting means comprises means for separating a section of the receiver element between each of the plurality of images, and wherein the output  
30 means further comprises means for disposing of the separated sections of the receiver element.

41. The digital photo-printing vending machine of claim 38, wherein the output means comprises:

means for printing information other than the at least one input image on a first section of the receiver element using fewer than all of the plurality of thermal print heads; and

means for printing the at least one input image from the customer on a second section of the receiver element.

10 42. The digital photo-printing vending machine of claim 41, wherein the first section precedes the second section on the receiver element.

43. The digital photo-printing vending machine of claim 41, wherein the information other than the at least one input image comprises a receipt for the customer.

44. The digital photo-printing vending machine of claim 41, wherein the information other than the at least one input image comprises promotional material.

20 45. A digital photo-printing vending machine comprising:

image data input means for receiving an input image from a digital camera provided by a customer;

output means for printing the input image to produce a digital photograph; and

25 means for providing the digital photograph to the customer.

46. The digital photo-printing vending machine of claim 45, wherein the image data input means comprises a receptacle for receiving the digital camera, the

receptacle including an electrical connector for connecting to an output port of the digital camera.

47. The digital photo-printing vending machine of claim 45, wherein the image data input means comprises a  
5 wireless receiver for receiving the input image from the digital camera over a wireless connection.

48. The digital photo-printing vending machine of claim 45, further comprising means for withholding the digital camera from the customer subsequent to printing  
10 the input image.

49. The digital photo-printing apparatus of claim 45, further comprising disabling means for preventing the digital camera from capturing additional digital photographs.

15 50. The digital photo-printing vending machine of claim 49, wherein the disabling means comprises:

means for identifying the number of digital photographs stored within a memory of the digital camera;

20 means for determining whether the identified number of digital photographs exceeds a maximum number of digital photographs; and

means for preventing the digital camera from capturing additional digital photographs if it is  
25 determined that the identified number of digital photographs exceeds the maximum number of digital photographs.

51. The digital photo-printing vending machine of claim 49, wherein the disabling means comprises:

30 means for identifying an amount of time that the digital camera has been in use;

means for determining whether the identified amount of time exceeds a maximum amount of time; and

means for preventing the digital camera from capturing additional digital photographs if it is  
5 determined that the identified amount of time exceeds the maximum amount of time.

52. A method for use in a thermal printer having a plurality of thermal print heads, each of the plurality of thermal print heads being operable to print a  
10 distinct one of a plurality of colors, the method comprising a step of:

(A) varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by the plurality of thermal print heads.

15 53. The method of claim 52, wherein a first one of the plurality of thermal print heads has a first number of thermal elements, wherein a second one of the plurality of thermal print heads has a second number of thermal elements, the first number being different than  
20 the second number, and wherein the method further comprises steps of:

(B) energizing the first one of the plurality of print heads at a first rate; and

(C) energizing the second one of the plurality of  
25 print heads at a second rate, wherein the first rate differs from the second rate.

54. The method of claim 52, further comprising steps of:

(B) performing tone scale adjustment on an image to  
30 be printed;

(C) performing thermal history correction on the image to be printed;

(D) performing resistance profile correction on the image to be printed;

5 (E) performing dithering on the image to be printed;

(F) performing halftone dot location adjustment on the image to be printed; and

(G) performing common mode voltage correction on  
10 the image to be printed.

55. A method for use in a thermal printer, the thermal printer including a plurality of thermal print heads, each of the plurality of thermal print heads being operable to print a distinct one of a plurality of  
15 colors, the method comprising a step of:

(A) printing using a thermal mass transfer method of printing selected from the group consisting of: (1) thermal mass transfer of a dye or pigment containing wax or resin, and (2) thermal mass transfer of an amorphous  
20 dye in combination with a thermal solvent.

56. The method of claim 55, further comprising a step of:

(B) varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by  
25 the plurality of thermal print heads.

57. The method of claim 55, wherein a first one of the plurality of thermal print heads has a first number of thermal elements, wherein a second one of the plurality of thermal print heads has a second number of  
30 thermal elements, the first number being different than

the second number, and wherein the method further comprises steps of:

(B) energizing the first one of the plurality of print heads at a first rate; and

5 (C) energizing the second one of the plurality of print heads at a second rate, wherein the first rate differs from the second rate.

58. The method of claim 55, further comprising steps of:

10 (B) performing tone scale adjustment on an image to be printed;

(C) performing thermal history correction on the image to be printed;

15 (D) performing resistance profile correction on the image to be printed;

(E) performing dithering on the image to be printed;

(F) performing halftone dot location adjustment on the image to be printed; and

20 (G) performing common mode voltage correction on the image to be printed.

59. A method for use in a thermal printer, the thermal printer including a plurality of thermal print heads, the method comprising steps of:

25 (A) performing tone scale adjustment on an image to be printed;

(B) performing thermal history correction on the image to be printed;

30 (C) performing resistance profile correction on the image to be printed;

(D) performing dithering on the image to be printed;

(E) performing halftone dot location adjustment on the image to be printed; and

5 (F) performing common mode voltage correction on the image to be printed.

60. The method of claim 59, wherein the steps (A)-(F) are performed in the order recited.

61. A method for use in a digital photo-printing vending machine, the method comprising steps of:

(A) receiving at least one input image from a customer;

(B) receiving a payment from the customer for printing the at least one input image; and

15 (C) printing the at least one input image from the customer using output means, the output means comprising a plurality of thermal print heads.

62. The method of claim 61, wherein the step (C) comprises a step of:

20 (C)(1) varying perceived levels of color printed by the thermal printer by varying sizes of dots printed by the plurality of thermal print heads.

63. The method of claim 62, wherein each of the plurality of thermal print heads is operable to print a distinct one of a plurality of colors.

64. The method of claim 61, wherein a first one of the plurality of thermal print heads has a first number of thermal elements, wherein a second one of the plurality of thermal print heads has a second number of thermal elements, the first number being different than

the second number, and wherein the step (C) comprises steps of:

(C)(1) energizing the first one of the plurality of print heads at a first rate; and

5 (C)(2) energizing the second one of the plurality of print heads at a second rate, wherein the first rate differs from the second rate.

65. The method of claim 61, wherein the step (A) comprises a step of receiving the at least one input  
10 image from a digital electronic storage medium.

66. The method of claim 65, wherein the step (A) comprises a step of converting at least one analog image provided by the customer into the at least one input image, wherein the at least one input image comprises at  
15 least one digital image.

67. The method of claim 61, wherein the at least one input image comprises a plurality of input images, and wherein the method further comprises a step of:

(D) converting the plurality of input images into a  
20 plurality of standardized images sharing a standardized file format.

68. The method of claim 67, wherein the step (D) comprises steps of:

(D)(1) processing the plurality of input images to  
25 produce a plurality of initial standardized images;

(D)(2) processing the plurality of initial standardized images to produce a plurality of enhanced images; and

(D)(3) processing the plurality of enhanced images  
30 to produce the plurality of standardized images.



69. The method of claim 68, wherein the step (D) comprises a step of cropping each of the plurality of input images to a standard aspect ratio.

70. The method of claim 68, wherein the step (D)(1) comprises steps of:

(D)(1)(a) determining, for each of the plurality of input images, whether the dimensions of the input image are greater than standard pixel dimensions; and

(D)(1)(b) changing to the standard pixel dimensions the dimensions of only those input images whose dimensions are determined to be greater than the standard pixel dimensions.

71. The method of claim 68, wherein the step (D)(1) comprises a step of assigning RGB color values having a common bit depth to pixels in each of the plurality of input images.

72. The method of claim 68, wherein the step (D)(1) comprises a step of rotating each of the plurality of input images into a standard orientation.

73. The method of claim 68, wherein the step (D)(1) comprises a step of converting each of the plurality of input images that is not stored in a predetermined image file format into the predetermined image file format.

74. The method of claim 68, wherein the step (D)(2) comprises a step of sharpening each of the plurality of initial standardized images.

75. The method of claim 68, wherein the step (D)(2) comprises a step of performing exposure correction on each of the plurality of initial standardized images.

76. The method of claim 68, wherein the step (D)(2) comprises a step of performing color balance correction on each of the plurality of initial standardized images.

77. The method of claim 68, wherein the step (D)(2)  
5 comprises a step of performing color matching on each of the plurality of initial standardized images.

78. The method of claim 68, further comprising steps of:

(D) receiving input from the customer; and  
10 (E) displaying output to the customer.

79. The method of claim 78, further comprising steps of:

(D) or receiving from the user a selection of a particular one of a plurality of image data input means;  
15 and

(E) using the selected image data input means as the image data input means for receiving the at least one input image from the customer.

80. The method of claim 78, wherein the at least  
20 one input image comprises a plurality of input images, and wherein the method further comprises steps of:

(F) receiving a selection from the customer of a subset of the plurality of input images; and

(G) printing the selected subset of the plurality  
25 of input images.

81. The method of claim 68, further comprising client means comprising steps of:

(D) converting the at least one input image into at least one standardized image having a standardized file  
30 format; and

(E) communicating with server means according to a client-server protocol, the server means comprising image file processing means for processing the at least one standardized image to produce at least one processed  
5 image, the server means further comprising means for transmitting the at least one processed image to the output means for printing.

82. The method of claim 68, wherein the step (C) comprises steps of:

10 (C)(1) printing information other than the at least one input image on a first section of the receiver element using fewer than all of the plurality of thermal print heads; and

(C)(2) printing the at least one input image from  
15 the customer on a second section of the receiver element.

83. The method of claim 82, wherein the information other than the at least one input image comprises a receipt for the customer.

20 84. The method of claim 82, wherein the information other than the at least one input image comprises promotional material.

85. A method for use by a digital photo-printing vending machine, the method comprising steps of:

25 (A) receiving an input image from a digital camera provided by a customer;

(B) printing the input image to produce a digital photograph; and

(C) providing the digital photograph to the  
30 customer.

86. The method of claim 85, wherein the step (A) comprises a step of receiving the digital camera into a receptacle, the receptacle including an electrical connector for connecting to an output port of the digital camera.

87. The method of claim 85, wherein the step (A) comprises a step of receiving the input image from the digital camera over a wireless connection.

88. The method of claim 85, further comprising a step of:

(D) withholding the digital camera from the customer subsequent to printing the input image.

89. The method of claim 85, further comprising a step of:

(D) preventing the digital camera from capturing additional digital photographs.

90. The method of claim 49, wherein the step (D) comprises steps of:

(D) (1) identifying the number of digital photographs stored within a memory of the digital camera;

(D) (2) determining whether the identified number of digital photographs exceeds a maximum number of digital photographs; and

(D) (3) preventing the digital camera from capturing additional digital photographs if it is determined that the identified number of digital photographs exceeds the maximum number of digital photographs.

91. The method of claim 49, wherein the step (D) comprises steps of:

(D) (1) identifying an amount of time that the digital camera has been in use;

(D) (2) determining whether the identified amount of time exceeds a maximum amount of time; and

5 (D) (3) preventing the digital camera from capturing additional digital photographs if it is determined that the identified amount of time exceeds the maximum amount of time.